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Specialty Selection and Success in Obtaining Choice of Residency Training among 1987 U.S. Medical Graduates by Race–Ethnicity and Gender

WENDY L. COLQUITT, M.A., IDELLE PRICE SMITH, M.S.W., M.P.H., and CHARLES D. KILLIAN, M.A.

Abstract—The authors developed baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), compared by gender and race–ethnicity. They focused on primary care specialties and obstetrics–gynecology versus all other specialties, and sought to identify group differences in (1) patterns of specialty preference, (2) evolution of specialty choice from before to after medical school, (3) success in attaining the first choice of specialty through the NRMP, and (4) patterns in switching from an alternate specialty (ranked second or lower) to the first-choice specialty between the first and second years of residency training. The results showed substantial intergroup and intragroup variations, both before and after medical school, for family practice, internal medicine, and obstetrics–gynecology. Examination of NRMP outcomes revealed that the underrepresented-minority (URM) graduates, particularly men, were less successful both in achieving any match and in matching to their first-choice specialties. Analyses of patterns in switching specialties revealed several important facts about those who were matched to alternate specialties: (1) over half entered their first-choice specialties in the second year; (2) women had more success in switching to their first-choice specialties than did men, particularly among the URMs; (3) among those who received alternate specialties, the URM women were more likely than the URM men to leave graduate medical education by the second year (reversing the trend for the other groups); and (4) individuals whose alternate specialties were in primary care were much less likely to switch to their first-choice specialties. *Acad. Med.* 67(1992):660–671.

This study developed baseline data on specialty selection and on success in obtaining residency positions. It examined by gender and racial–ethnic group the differences in patterns of specialty preferences before and after entry into medical school, senior medical students' successes in attaining their first choices of specialty through the National Resident Matching Program (NRMP), and the stability of medical students' specialty selections in the first and second years of residency training. We focused special attention on career choices in the primary care specialties and obstetrics–gynecology.

Variation over time in specialty choices has been a popular research topic, but few studies in the last several years have documented the patterns and evolution of specialty choices using national data.[1–3] Previous studies found gender and minority-group differences in specialty preferences at various points in training,[4–7] but none examined variations in specialty preference by both gender and race–ethnicity.

Our study also analyzed the relative success of senior medical students in obtaining their first choices of specialties in the NRMP, the system through which medical students and U.S. residency training programs are matched. The system uses a computer algorithm to match students with programs, using the rank-ordered preferences of each. Previous research on NRMP outcomes has drawn on both individual-level and aggregate-level data. In a 1990 study using detailed NRMP rank-order selection data to examine whether students or programs were more successful in getting their desired matches,[8] the researchers concluded that students were more successful. However, because the authors examined all students as a group, they were not able to detect whether some groups of students were more successful than others.

NRMP outcomes have been studied with aggregate data in several ways. The lower match rates experienced by underrepresented minorities have been documented for several

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years,[9-11] although it is possible that many of these students obtained residency positions outside the NRMP.[12,13] Additionally, some research suggests ways in which the match process, specifically the programs' ranking procedures with regard to minority applicants, may be biased against minority applicants as a whole.[9] To address questions about how minority students fare in the NRMP, we sought to determine whether minority and nonminority applicants differed in the extents to which they (1) matched to any program, (2) matched to their first choices of specialties, or (3) were able to obtain their first specialty choices for their second postgraduate year (PGY-2) of medical education.

Method

We examined the three issues just described in regard to the 1987 U.S. medical school graduates who participated in the 1987 NRMP. In 1987 there were 16,126 U.S. graduates, 90% of whom (14,450) participated in the 1987 Match. The gender and racial-ethnic proportions of these match participants were representative of the 1987 U.S. medical school graduating class, with the exception of African Americans and Puerto Ricans, both of whom were underrepresented in the NRMP.

Data for this research were obtained from the Association of American Medical Colleges' (AAMC's) Student and Applicant Information Management System (SAIMS) and from the NRMP. Information on the specialty preferences of premedical students is collected annually on the Premedical Student Questionnaire (PMQ), a survey completed as part of registration for the Medical College Admission Test (MCAT). The first choices of specialty training upon completion of medical school were considered to be the specialties of the programs that the students ranked highest on their NRMP rank-order lists. Match specialties were the actual specialties in which the 1987 senior medical students obtained their first postgraduate year (PGY-1) residency positions through the NRMP. The types of residencies in which the students were found in PGY-2 were available through the AAMC's graduate medical education (GME) tracking census. Information was also available on various other nonresidency training activities in which individuals may be engaged, such as research, taking a year off, entering medical practice, or leaving GME.

The measurement of specialty stability and switching in the first two years of residency training was based on each specialty board's certification requirements (as presented in the *1988-1989 Directory of Graduate Medical Education Programs Accredited by the Accreditation Council for Graduate Medical Education*). The requirements were used to determine the consistency of the specialty entered in the second year of residency with the NRMP first choice of specialty.

The analyses focused on differences by gender and racial-ethnic group in terms of the graduates' specialty preferences, consistency or change in specialty preferences, and experiences in the NRMP. We used the designations that previously have been used in the population parity model to identify racial-ethnic groups underrepresented in medicine. The *underepresented minority* (URM) groups were Native Americans (American Indians and Alaskan Natives), Mexican Americans, Mainland Puerto Ricans, and African Americans (comprising all 761 graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents). *Other-minority* groups, not underrepresented in medicine but included in the analysis, were Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanics other than Puerto Ricans and Mexican Americans. Whites not of Hispanic origin constitute the majority of medical graduates and residents and were referred to in this study as the *nonminority* group.

Our study focused on identifying patterns in the selection of primary care specialties versus other specialty fields among the 1987 medical graduates. The primary care specialties were considered to be family practice, general internal medicine, and pediatrics. Additional comparisons were made between obstetrics-gynecology and other specialties. Since data on practice plans were not available for this research, the analysis of primary care specialties had to begin with the graduates' NRMP first choices of specialty and so must be interpreted cautiously. The data may overestimate the participation of individuals in primary care because some may later have sought to subspecialize. However, the purpose of this research was not to estimate the supply of primary care practitioners but instead to compare intergroup differences in specialty preferences and outcomes at different points in medical training, particularly during the period of the NRMP match and the years immediately following.

The analysis presents crosstabulated data on the specialty preferences, NRMP experiences, and actual residency specialties of the 1987 graduates with their gender and racial-ethnic status. The tables include counts and proportional distributions for each group. Inferential statistics commonly used to indicate the presence or absence of a relationship are not necessary for this research, since this study examined an entire population (i.e., the 1987 U.S. medical school graduates). In each section of this study, we report notable percentage differences (in most cases, 3% or more). A three-percentage-point difference can represent large and substantive differences between groups. For minority-group and gender comparisons especially, the absolute numbers reflected by these differences are important. Since our purpose was to develop baseline data, a decrease in the proportional differences between groups is meaningful; for example, the change from a six-percentage-point difference between groups in primary care preference before medical school to a three-percentage-point difference at the end of medical school is important. Findings of similarities between groups as well as large differences are important.

Results

Overall, the results showed that the differences between URMs and others in the preference for primary care careers observed before medical school had diminished by the end of medical school. The differences between preferences for primary care specialties were greater among URM groups than between URMs and other minorities or between URMs and nonminorities. We found substantial differences in the NRMP outcomes by racial–ethnic group and also differences in the patterns of attrition and PGY-2 training for those who matched to alternate specialties (ranked second or lower for the NRMP).

Pre–Medical-school Specialty Preferences

Substantial differences among racial–ethnic groups' pre–medical-school preferences were found for family practice, general internal medicine, and obstetrics–gynecology (shown in Table 1). Family practice included those indicating either family practice or general practice on the PMQ. While racial–ethnic differences were minor in preferences for pediatrics, gender differences were substantial.

Family practice. Family practice attracted nearly equal proportions of URM (27%) and nonminority (25%) pre–medical-school students but substantially fewer of other minorities (18%). The two largest URM groups, African Americans and Mexican Americans, differed considerably in their preferences for family practice: 40% of Mexican Americans but only 23% of African Americans preferred family practice. The greater family practice interest among Mexican Americans was due to the unusually high percentage of Mexican-American men citing this career (44%). However, Mexican-American women were more likely to indicate a future career in family practice (33%) than were all other racial–ethnic groups of women except Native-American women (50%).

Internal medicine. General internal medicine was preferred at the same rate (7%) by URM and nonminority students and slightly more by other-minority students (9%).

Obstetrics–gynecology. Differences were also noted in preferences for obstetrics–gynecology. URM students were more likely to select obstetrics–gynecology than were nonminority or other-minority students (8% compared with 3% and 4%, respectively). This difference was even more pronounced when gender was considered, because URM women preferred this specialty more than did other women, and URM men preferred it more than did other men. In addition, gender alone was found to be a significant factor in pre–medical-school choice of obstetrics–gynecology. Women chose obstetrics–gynecology up to nine times as often as did men (URMs, 14% versus 4%; other minorities, 9% versus 2%; and nonminorities, 9% versus 1%). The greater pre–medical-school preferences observed among URM men was due to the higher preference rate of African-American men (5%) relative to other men. The greater preference for obstetrics–gynecology of URM women relative to other women resulted from the very high proportions of African-American women, Mexican-American women, and Mainland Puerto Rican women choosing this specialty (13%, 17%, and 22%, respectively).

Pediatrics. Women of all groups indicated a desire to enter pediatrics more frequently than did men (URMs 14% versus 7%; other minorities, 14% versus 6%; and nonminorities, 11% versus 7%). URM and other-minority women were somewhat more likely to select pediatrics than were nonminority women.

Combined primary care. The preference rates for the combined primary care specialties show that the largest difference was between URM and other-minority students. About 43% of URM students compared with 36% of other minorities preferred a primary care specialty. Most of this difference reflected the much greater preference for family practice among URMs. The 40% proportion of nonminority students fell midway between those of the students in the URM and other-minority groups.

When obstetrics–gynecology was included with the primary care specialties, the proportion of URMs interested in primary care was greater than the proportions of other minorities and nonminorities (52% versus 42% and 45%).

Specialty Preferences as Seniors

These preferences were measured by the students' first choices in the NRMP. By the end of medical school, the same three specialties that had differed substantially by minority group status at the premedical stage (family practice, internal medicine and obstetrics–gynecology) continued to attract racial–ethnic groups at different rates. These data are presented in Table 2.

Family practice. Family practice attracted URM senior medical students at the highest rate (14%), followed closely by nonminority students (13%), and more distantly by other-minority students (7%). Patterns of variation within the URM group were similar to those found at the premedical stage: African-American students selected family practice in about the same proportion as did nonminority students (12% versus 13%), while Mexican-American students chose it about twice as often (25%). Also, as was found at the pre–medical-school stage, Mexican-American men were more likely to choose family practice than were Mexican-American women (29% versus 17%), and the rate for Mexican-American women remained higher than the rate for all other groups of women except Native-American women (18%).

Internal medicine. Internal medicine programs were first-ranked most often by other-minority students (30%), followed by URM students (25%) and nonminority students (23%). These rates did not differ substantially for men and women in each group.

Obstetrics–gynecology. Smaller dif-

Table 1

Pre–Medical-school Specialty Choices of 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial-Ethnic Status by Gender	Pre-Medical-school Specialty Choice												Total No. in Row
	No Response		Family Practice		Internal Medicine		Pediatrics		Obstetrics–Gynecology		All Others		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Women													
Underrepresented minority													
African American†	27	8.0	72	21.4	19	5.6	48	14.2	45	13.4	126	37.4	337
American Indian, Alaskan Native	3	10.7	14	50.0	2	7.1	2	7.1	1	3.6	6	21.4	28
Mexican American	4	5.3	25	33.3	2	2.7	11	14.7	13	17.3	20	26.7	75
Mainland Puerto Rican	1	3.7	2	7.4	1	3.7	4	14.8	6	22.2	13	48.1	27
Other minority‡	60	14.3	80	19.0	33	7.9	58	13.8	36	8.6	153	36.4	420
Nonminority§	469	12.3	917	24.0	195	5.1	417	10.9	331	8.7	1,490	39.0	3,819
Unknown	20	40.8	6	12.2	3	6.1	2	4.1	5	10.2	13	26.5	49
Total	584	12.3	1,116	23.5	255	5.4	542	11.4	437	9.2	1,821	38.3	4,755
Men													
Underrepresented minority													
African American†	52	12.3	99	23.3	35	8.3	23	5.4	23	5.4	192	45.3	424
American Indian, Alaskan Native	6	20.0	9	30.0	2	6.7	4	13.3	0	0.0	9	30.0	30
Mexican American	10	7.1	62	44.0	9	6.4	8	5.7	3	2.1	49	34.8	141
Mainland Puerto Rican	5	10.6	15	31.9	2	4.3	8	17.0	1	2.1	16	34.0	47
Other minority‡	123	15.4	137	17.2	78	9.8	50	6.3	15	1.9	394	49.4	797
Nonminority§	1,102	13.5	2,111	26.0	579	7.1	539	6.6	78	1.0	3,725	45.8	8,134
Unknown	46	37.7	22	18.0	6	4.9	7	5.7	1	0.8	40	32.8	122
Total	1,344	13.9	2,455	25.3	711	7.3	639	6.6	121	1.2	4,425	45.6	9,695
GRAND TOTAL	1,928	13.3	3,571	24.7	966	6.7	1,181	8.2	558	3.9	6,246	43.2	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program, they compared, by the graduates' gender and race–ethnicity, the specialty preferences the graduates had indicated on the Premedical Student Questionnaire when they are registered for the Medical College Admission Test.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

Table 2

Post–Medical-school First-choice Specialties of 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial–Ethnic Status by Gender	Post–Medical-school Specialty Choice										Total No. in Row
	Family Practice		Internal Medicine		Pediatrics		Obstetrics–Gynecology		All Others		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Women											
Underrepresented minority											
African American†	47	13.9	82	24.3	44	13.1	49	14.5	115	34.1	337
American Indian, Alaskan Native	5	17.9	4	14.3	2	7.1	5	17.9	12	42.9	28
Mexican American	13	17.3	17	22.7	9	12.0	16	21.3	20	26.7	75
Mainland Puerto Rican	2	7.4	9	33.3	4	14.8	2	7.4	10	37.0	27
Other minority‡	32	7.6	130	31.0	63	15.0	42	10.0	153	36.4	420
Nonminority§	489	12.8	904	23.7	639	16.7	377	9.9	1,410	36.9	3,819
Unknown	4	8.2	10	20.4	7	14.3	6	12.2	22	44.9	49
Total	592	12.5	1,156	24.3	768	16.2	497	10.5	1,742	36.6	4,755
Men											
Underrepresented minority											
African American†	41	9.7	110	25.9	19	4.5	30	7.1	224	52.8	424
American Indian, Alaskan Native	7	23.3	5	16.7	1	3.3	3	10.0	14	46.7	30
Mexican American	41	29.1	36	25.5	10	7.1	6	4.3	48	34.0	141
Mainland Puerto Rican	4	8.5	11	23.4	5	10.6	1	2.1	26	55.3	47
Other minority‡	55	6.9	240	30.1	41	5.1	48	6.0	413	51.8	797
Nonminority§	1,060	13.0	1,859	22.9	462	5.7	297	3.7	4,456	54.8	8,134
Unknown	10	8.2	38	31.1	11	9.0	5	4.1	58	47.5	122
Total	1,218	12.6	2,299	23.7	549	5.7	390	4.0	5,239	54.0	9,695
GRAND TOTAL	1,810	12.5	3,455	23.9	1,317	9.1	887	6.1	6,981	48.3	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared, by the graduates' gender and race-ethnicity, the first-choice specialties the graduates indicated on the NRMP rank lists.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

Table 3

Types of Matches Achieved through the NRMP for 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial–Ethnic Status by Gender	Matched to First and Only Choice		Matched to First of Two or More Choices		Matched to Second or Lower-ranked Choice		Did Not Match	
	No.	%	No.	%	No.	%	No.	%
Women								
Underrepresented minority								
African American†	211	62.6	82	24.3	20	5.9	24	7.1
American Indian, Alaskan Native	18	64.3	8	28.6			2	7.1
Mexican American	45	60.0	22	29.3	5	6.7	3	4.0
Mainland Puerto Rican	15	55.6	10	37.0	1	3.7	1	3.7
Other minority								
Asian, Pacific Islander	172	55.7	89	28.8	38	12.3	10	3.2
Commonwealth Puerto Rican	20	62.5	6	18.8	2	6.3	4	12.5
Other Hispanic	47	59.5	23	29.1	5	6.3	4	5.1
Nonminority‡	2,307	60.4	1,088	28.5	291	7.6	133	3.5
No response	21	42.9	20	40.8	6	12.2	2	4.1
Total	2,856	60.1	1,348	28.3	368	7.7	183	3.8
Men								
Underrepresented minority								
African American†	213	50.2	94	22.2	43	10.1	74	17.5
American Indian, Alaskan Native	14	46.7	5	16.7	2	6.7	9	30.0
Mexican American	83	58.9	34	24.1	9	6.4	15	10.6
Mainland Puerto Rican	25	53.2	13	27.7	7	14.9	2	4.3
Other minority								
Asian, Pacific Islander	172	55.7	89	28.8	38	12.3	10	3.2
Commonwealth Puerto Rican	20	62.5	6	18.8	2	6.3	4	12.5
Other Hispanic	47	59.5	23	29.1	5	6.3	4	5.1
Nonminority‡	2,307	60.4	1,088	28.5	291	7.6	133	3.5
No response	69	56.6	37	30.3	12	9.8	4	3.3
Total	5,514	56.9	2,658	27.4	898	9.3	625	6.4
GRAND TOTAL	8,370	57.9	4,006	27.7	1,266	8.8	808	5.6

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared, by the graduates' gender and race–ethnicity, the types of match specialties (i.e., first choice of specialty or second or lower-ranked choice) received by the graduates.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Nonminority* indicates whites not of Hispanic origin.

ferences were observed in the first-choice preferences for obstetrics–gynecology. URM students selected obstetrics–gynecology at a higher rate (10%) than did other-minority (7%) or nonminority students (6%). In general, men were less likely to choose obstetrics–gynecology (URM men, 6%; other-minority men, 6%; and nonminority men, 4%). This tendency was evident at the premedical stage and had diminished only somewhat. Among women, URMs were the most likely to choose obstetrics–gynecology (15%), while the rate was 10% for both other-minority women and nonminority women.

Pediatrics. Differences were found by gender but not by racial–ethnic group in the selection of pediatrics. Overall, women ranked pediatrics as their first choice much more frequently than did men. Nonminority women selected pediatrics most often (17%), followed by other-minority women (15%) and URM women (13%); among men, other-minority men chose pediatrics least often (5%), while equal proportions of URM and nonminority men selected pediatrics (6% for each group).

Combined primary care. Despite the

racial-ethnic differences in the selections of internal medicine and family practice, when the primary care specialties (internal medicine, family practice, and pediatrics) were considered as a group, the variations were minor. About 48% of the URM students, 46% of the other-minority students, and 45% of nonminority students chose primary care specialties. When obstetrics-gynecology was included as primary care, the URM students were more likely to prefer a primary care specialty than were the nonminority students (58% versus 52%), while the rate for other-minority students was 54%. These differences were directly attributable to the greater interest of Mexican Americans in family practice and obstetrics-gynecology, the greater interest of African Americans in obstetrics-gynecology, and the greater interest among other minorities in internal medicine.

Match Outcomes

Results of the 1987 NRMP match by gender and race-ethnicity are displayed in Table 3. A large majority (85%) of the 1987 U.S. graduates who participated in the NRMP received matches to their first choices of specialties. Over 58% of the graduates participating in the NRMP ranked only one specialty for the match process. Approximately 9% matched to residencies in alternate (second- or lower-ranked) specialty preferences, and about 6% did not obtain a match to any program through the NRMP.

Rates of success and failure in achieving a match through the NRMP varied by gender and race-ethnicity. Women were more successful in obtaining their first choices of specialties (88% versus 84%). Twelve

Table 4

Match Specialties Received through the NRMP for 1987 U.S. Medical School Graduates Compared by Race-Ethnicity and Gender*

Racial-Ethnic Status by Gender	NRMP Match Specialty										Total No. in Row
	Family Practice		Internal Medicine		Pediatrics		Obstetrics-Gynecology		All Others		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Women											
Underrepresented minority											
African American†	40	11.9	87	25.8	45	13.4	47	13.9	118	35.0	337
American Indian, Alaskan Native	5	17.9	4	14.3	2	7.1	4	14.3	13	46.4	28
Mexican American	12	16.0	16	21.3	12	16.0	15	20.0	20	26.7	75
Mainland Puerto Rican	2	7.4	10	37.0	4	14.8	2	7.4	9	33.3	27
Other minority‡	27	6.4	139	33.1	67	16.0	38	9.0	149	35.5	420
Nonminority§	475	12.4	941	24.6	638	16.7	353	9.2	1,412	37.0	3,819
Unknown	2	4.1	10	20.4	9	18.4	4	8.2	24	49.0	49
Total	563	11.8	1,207	25.4	777	16.3	463	9.7	1,745	36.7	4,755
Men											
Underrepresented minority											
African American†	34	8.0	109	25.7	18	4.2	27	6.4	236	55.7	424
American Indian, Alaskan Native	4	13.3	5	16.7	1	3.3	1	3.3	19	63.3	30
Mexican American	34	24.1	38	27.0	13	9.2	6	4.3	50	35.5	141
Mainland Puerto Rican	3	6.4	14	29.8	4	8.5	1	2.1	25	53.2	47
Other minority‡	48	6.0	234	29.4	42	5.3	40	5.0	433	54.3	797
Nonminority§	1,030	12.7	1,926	23.7	465	5.7	283	3.5	4,430	54.5	8,134
Unknown	10	8.2	38	31.1	8	6.6	5	4.1	61	50.0	122
Total	1,163	12.0	2,364	24.4	551	5.7	363	3.7	5,254	54.2	9,695
GRAND TOTAL	1,726	11.9	3,571	24.7	1,328	9.2	826	5.7	6,999	48.4	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared, by the graduates' gender and race-ethnicity, the match specialties received by the graduates.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

percent of URM, 7% of other-minority, and 5% of nonminority students did not match. Among men, Native Americans, African Americans, and Mexican Americans had the highest non-match rates (30%, 18%, and 11%, respectively); but when they were matched to residencies, Mexican-American men were among the most successful men in obtaining their first choices of specialties. Among women, Commonwealth Puerto Ricans, African Americans, and Native Americans experienced the highest non-match rates (13%, 7%, and 7%, respectively). Women from the Commonwealth of Puerto Rico were the only group of women who were less successful in obtaining matches than were their male counterparts.

Specialties Entered in PGY-1 and PGY-2

Many of the patterns observed at the pre-medical-school level and the NRMP stage were repeated during the PGY-1 and PGY-2 residency training, a result of the high percentages of these students who received matches to their first choices of specialties (Tables 4 and 5). URM students as a group entered PGY-1 and PGY-2 residencies in family practice and obstetrics-gynecology at higher rates than did nonminority and other-minority students. Moreover, Mexican-American men showed the greatest interest in family practice. Both Mexican-American women and African-American women continued to show a greater interest than other women in obstetrics-gynecology. Furthermore, African-American men continued to show more interest than other men in obstetrics-gynecology careers, and the other-minority group continued to show greater interest in careers in internal medicine than did the other racial-ethnic groups.

Those Who Matched to Alternate Specialties

We were particularly interested in assessing whether the students who did not receive their first choices of specialties through the NRMP were able to pursue those choices later. To address this issue, we examined the likelihood of entering the NRMP first choice of specialty (or one consistent with it in terms of certification requirements) in the PGY-2 and the rates of attrition from GME for those who matched to alternate (second- or lower-ranked) choices. Table 6 shows the comparisons of the NRMP first-ranked choices of specialties with actual PGY-2 positions. Among all the graduates who matched to alternate specialties, 55% entered their first choices in PGY-2; that is, over half of those who did not receive matches to their preferred specialties through the NRMP were able to obtain positions in those specialties (or in specialties with compatible training requirements) in the second year of GME.

A small overall gender difference was noted in the likelihoods of all 1987 graduates returning to first-choice specialties in the second year of GME (57% of women versus 54% of men), but larger gender differences were found within racial-ethnic groups. The intragroup gender differences are important in interpreting variation among minority groups. For example, while 47% of the URM residents who did not match to their first choices of specialties obtained positions in their first-choice specialties in the second year, this figure masks the different experiences of URM women and URM men. The proportion of URM women was 65%, compared with 39% for URM men. In other words, URM women appear to have had a better-than-average chance of eventually entering their desired specialties, while URM men had a much lower-than-average chance. Other-minority men fared better (49% changed to first choices) than URM men, but other-minority men fared less well than other-minority women (53% of whom had changed).

Nonminority men were the most likely of all men (55%) to persevere for their first choices of specialties. The gender pattern observed among nonminorities was the same as that found for the other groups, where women were more likely to switch, though the size of the difference (2%) for nonminorities was minimal.

Among all the residents who matched to primary care residencies and for whom these were not their first choices of specialties, 49% secured positions in their preferred specialties by their second year of residency. This rate was lower than that of the residents who matched to alternate specialties in all other specialties (57%).

In both the primary care specialties and all other specialties, the likelihood of obtaining one's first choice in PGY-2 varied by racial-ethnic group. Among the first-year residents in primary care, the URM residents were least likely to obtain positions in their first choices of specialties (40%), though this is still a substantial amount of change. Nonminority and other-minority residents were about equally likely to enter their first-choice specialties (50% and 51%, respectively). Of the residents in other specialties, other minorities were least likely to enter their first-choice specialties (49%), followed by URMs (55%) and nonminorities (58%).

Attrition rates varied between those who had matched to first-choice specialties and those who had matched to alternate-choice specialties (Table 7). Those who had matched to alternate-choice specialties were more likely to discontinue their GME (9%) than were those who had matched to their first choices (6%). Among those matching to alternate choices, gender differences in rates of attrition were found within each minority group. URM women were more likely than URM men to quit GME training after PGY-1 (15% versus 10%). This pattern was the reverse of those found for nonminorities (7% of women versus 10% of men) and other minorities (4% of women versus 15% of men).

Conclusion

Overall, the URM students were slightly more likely to have had initial interests in primary care and to rank primary care specialties in the NRMP match process at rates higher than the other groups. The greater preference for primary care special-

Table 5

Specialties Entered in the Second Postgraduate Year by 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial-Ethnic Status by Gender	Specialty Entered in PGY-2: Family Practice No.	Family Practice %	Internal Medicine No.	Internal Medicine %	Pediatrics No.	Pediatrics %	Obstetrics–Gynecology No.	Obstetrics–Gynecology %	All Others No.	All Others %	Not in GME No.	Not in GME %	Total No. in Row
Women													
Underrepresented minority													
African American†	40	11.9	80	23.7	46	13.6	41	12.2	98	29.1	32	9.5	337
American Indian, Alaskan Native	4	14.3	3	10.7	3	10.7	5	17.9	10	35.7	3	10.7	28
Mexican American	12	16.0	17	22.7	12	16.0	14	18.7	13	17.3	7	9.3	75
Mainland Puerto Rican	2	7.4	9	33.3	5	18.5	2	7.4	6	22.2	3	11.1	27
Other minority‡	27	6.4	133	31.7	62	14.8	36	8.6	131	31.2	31	7.4	420
Nonminority§	478	12.5	876	22.9	637	16.7	338	8.9	1,253	32.8	237	6.2	3,819
Unknown	3	6.1	10	20.4	10	20.4	4	8.2	19	38.8	3	6.1	49
Total	566	11.9	1,128	23.7	775	16.3	440	9.3	1,530	32.2	316	6.6	4,755
Men													
Underrepresented minority													
African American†	40	9.4	125	29.5	20	4.7	27	6.4	165	38.9	47	11.1	424
American Indian, Alaskan Native	5	16.7	7	23.3	1	3.3	3	10.0	11	36.7	3	10.0	30
Mexican American	36	25.5	38	27.0	12	8.5	3	2.1	41	29.1	11	7.8	141
Mainland Puerto Rican	3	6.4	15	31.9	2	4.3	1	2.1	22	46.8	4	8.5	47
Other minority‡	52	6.5	248	31.1	45	5.6	41	5.1	353	44.3	58	7.3	797
Nonminority§	1,022	12.6	1,921	23.6	480	5.9	297	3.7	3,894	47.9	520	6.4	8,134
Unknown	12	9.8	36	29.5	10	8.2	5	4.1	52	42.6	7	5.7	122
Total	1,170	12.1	2,390	24.7	570	5.9	377	3.9	4,538	46.8	650	6.7	9,695
GRAND TOTAL	1,736	12.0	3,518	24.3	1,345	9.3	817	5.7	6,068	42.0	966	6.7	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program, they compared, by the graduates' gender and race-ethnicity, the specialties the graduates entered in their second postgraduate year (PGY-2). They also analyzed data on graduates who were not involved in graduate medical education (GME).

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

ties of the URM than the nonminority students is accounted for by the URMs' greater interests in family practice and pediatrics. During medical school these differences disappeared and the main difference found between these groups upon leaving medical school was that larger proportions of the URM and other-minority than the nonminority students desired careers in internal medicine. The URM students initially matched to their first preferences for primary care specialties at essentially the same rates as did other racial-ethnic groups, but more URM than other graduates switched into primary care residencies between the first and second years of GME.

The URM groups were found to have very different patterns of specialty preferences. Analyses showed that Mexican Americans, especially men, had a much higher preference for family practice than did any other group. That pattern was maintained throughout medical school and early residency training. The preferences of African Americans for family practice, internal medicine, and pediatrics were very similar to those of nonminorities.

The other-minority students differed from both the URM and the nonminority students in that the other-minority students had much less interest in family practice and slightly more interest in internal medicine before entering medical school. During medical schooling, other minorities had a large increase in the preference for training in internal medicine, which was greater than the corresponding increases for URM and nonminority students. The net result was that by the end of medical school the other-minority students preferred primary care specialties as often as did the nonminority and URM students, but the specialty mixes for the groups were different.

Another significant factor in explaining preference for primary care specialties is the variation by gender. The preference patterns of the individual minority groups were not the same for men and women. This was especially notable in the case of pediatrics, where the women of each group were nearly twice as likely as the men to prefer it before entering medical school. At that time, the URM and other-minority women chose pediatrics most often, but by the end of medical school, the nonminority women were the most likely to rank pediatrics first. This had the effect of widening the sex difference in overall preference for primary care among the nonminority students by the end of medical school.

The other major difference before medical school between the URM and the other students was in the preference for obstetrics-gynecology. The URM students, particularly African-Americans and Mexican-American women, were twice as likely to choose this specialty as were the nonminority or other-minority students. The

Table 6

Numbers and Percentages of 1987 Medical School Graduates Matched to Alternate Specialties in PGY-1 Who Entered Their First-choice Specialties in PGY-2, Compared by Race–Ethnicity, Gender, and Alternate Specialty*

Gender, Race–Ethnicity and Alternative Specialty	No.	%
Graduates		
Men	480	54
Women	210	57
Total	690	55
Underrepresented minority†		
Men	24	39
Women	17	65
Total	41	47
Other minority‡		
Men	32	49
Women	24	53
Total	56	51
Nonminority§		
Men	419	55
Women	167	57
Total	586	56
Primary care specialties		
Underrepresented minority†	17	40
Other minority‡	22	51
Nonminority§	175	50
All other specialties		
Underrepresented minority†	24	55
Other minority‡	33	49
Nonminority§	406	58

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program, they compared the numbers and percentages of the graduates matched to alternate specialties (their second or lower-ranked choices) in their first postgraduate year (PGY-1) who entered their first-choice specialties (or specialties consistent with their first choices in terms of certification requirements) in their second postgraduate year (PGY-2) according to the graduates' gender, race-ethnicity, and alternate (PGY-1) specialties.

†*Underrepresented minority* indicates American Indians and Alaskan Natives, Mexican Americans, Mainland Puerto Ricans, and African Americans (i.e., all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents).

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

Table 7

Rates of Attrition after One Year of Residency Training for the 1987 U.S. Medical School Graduates Who Received Positions through the NRMP, Compared by Race–Ethnicity and Gender*

Racial-Ethnic Status by Gender	All 1987 NRMP Match Recipients		1987 Match Recipients in First Choice of Specialty		1987 Match Recipients in Second or Lower Choice of Specialty	
	No.	%	No.	%	No.	%
Nonminority†						
Men	440	5.7	366	5.3	74	9.7
Women	215	5.9	196	5.7	19	6.5
Underrepresented minority‡						
Men	47	8.7	41	8.5	6	9.8
Women	40	9.2	36	8.3	4	15.4
Other minority§						
Men	43	5.9	33	5.0	10	15.2
Women	27	6.7	25	7.0	2	4.4
Total men‖	535	5.9	444	5.4	91	10.2
Total women‖	284	6.2	259	6.1	25	6.8
GRAND TOTAL‖	819	6.0	703	5.7	116	9.2

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared the rates of attrition for the graduates who obtained positions through the NRMP according to the graduates' race-ethnicity and gender.

†*Nonminority* indicates whites not of Hispanic origins.

‡*Underrepresented minority* indicates American Indians and Alaskan Natives, Mexican Americans, Mainland Puerto Ricans, and African Americans (i.e., all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents).

§*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

‖Includes those individuals whose ethnicity was unknown, in addition to members of the underrepresented minorities, the other minorities, and the nonminority group.

URM men were more likely than other men to be interested in obstetrics–gynecology before medical school, but by the end of medical school and the second year of residency, African-American men preferred this specialty at a higher rate than did the other URM men, other-minority men, and nonminority men. Overall group differences in preference for obstetrics–gynecology remained throughout medical school, primarily as a result of greater interest among African-Americans and Mexican-American women.

Significant gender and racial–ethnic differences were found regarding NRMP match outcomes. Overall, women were more successful in obtaining matches to their first-choice specialties than were men. URMs, particularly URM men, were the most likely not to match at all. The highest nonmatch rates were for Native-American, African-American, and Mexican-American men.

Discussion

One of the concerns this research initially sought to address was whether URM students enter the primary care specialties in disproportionate numbers by choice or because they are somehow steered into them. Several of the findings shed light on this question. First, the results of the 1987 NRMP match revealed that the vast majority of minority students received their first choices of specialties in the program. The rates for matching to second-choice or lower-ranked specialties were similar for URM and all other students. The total number of URM students who received matches to second-choice or lower-ranked specialties in the NRMP was 87. These findings suggest that URMs are not channeled into specialties in which they are not interested. Of greater concern to the issue of obtaining a desired specialty is the large number of URMs who did not match, a finding consistent with results that have been documented from 1985 through 1990.[10,12,13] In our study, the unmatched rate for URMs was twice the national rate, and resulted in 130 URM students who participated in the 1987 NRMP match and did not receive a match through it. We do not know whether the unmatched URMs who obtained residency positions outside of the NRMP are overrepresented in primary care specialties.

A second source of information to illuminate the concern regarding URM graduates' disproportionate numbers in primary care is the pattern of specialty preferences expressed before medical school. The URM students entered medical school with greater interest in primary care than other-minority students and slightly more interest than nonminority students, and left with only slightly more interest than other groups. Thus, it appears that URMs are entering primary care specialties

by choice; if medical schools were tracking URMs into primary care, then we would expect the proportion interested in these specialties to increase and the intergroup differences to increase. It should be noted, though, that the preferences for primary care among URMs were not evenly distributed across groups or specialties; rather, they were skewed by Mexican Americans' greater preference for family practice. In contrast, the specialty preferences of African Americans for primary care were very similar to those of nonminorities. Thus, statements based on aggregated ethnicity data (for example, that URMs are more likely to enter primary care than others) may oversimplify the true situation. Finally, there are two other significant factors, not examined in this research, that may lead to disproportionately high numbers of URMs' entering primary care fields: (1) differential medical school admission criteria for URM students that include their specialty preferences and (2) differential professional socialization between URM and other students.

Future research on this topic would benefit from (1) careful examination of variations within the URM and other-minority groups, (2) studies of the effects of professional socialization, (3) utilization of data on plans for certification and aspirations for practice specialties, (4) development of a survey of third-year residents about GME training experiences and career plans, (5) inclusion of information on the full GME experience and actual certification of students, and (6) analyses of the evaluation component (i.e., ranking of candidates) of the NRMP matching process.

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Declining Class Size and the Decline in Graduates Choosing Family Medicine

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Abstract—In light of the major concern about the marked decline in the numbers of graduates from U.S. medical schools who are entering family medicine, the authors analyzed the effect of declining class size on the numbers of graduates entering family medicine residencies. Data were analyzed from ten years of graduating classes (1981–1990) from the 81 medical schools graduating the most family physicians. The analysis confirmed that declining class size is related to the decline in the production of family physicians. In particular, the 31 schools with the largest declines in the numbers of graduates overall (from the early 1980s compared with the late 1980s and 1990) demonstrated as a group a large fall (nearly 25%) in the production of family physicians. The authors conclude that the large reductions in class size in many medical schools are associated with even larger reductions in the numbers of future family physicians being graduated from U.S. medical schools. *Acad. Med.* 67(1992): 680–684.

The discipline of family medicine has recognized a marked downturn of U.S. medical school graduates entering its residencies during the late 1980s. That trend was particularly noted in the National Resident Matching Program's matches of 1988 and 1989.[1] The trend followed one year after a marked decline, which has also been persistent and worsening, in the specialty of internal medicine. Both declines continued through the Match of 1991. A long-cited goal of the American Academy of Family Physicians (AAFP) is that 25% of medical school graduates complete residencies and pursue careers in family practice.[1] Medical school graduating-class size peaked in the mid-1980s, when there were over 16,000 U.S. graduates a year. Twenty-five percent of that number would be approximately 4,000 graduates each year. Unfortunately, the number of U.S. medical school graduates in 1990 entering family practice was closer to 1,600 students. This number represents not only an almost 20% decline from the early 1980s, when over 2,000 students per year entered family medicine from U.S. medical schools but also a disturbing, indeed shocking, 60% shortage from perceived national needs.

National needs for family physicians are substantial, especially in underserved areas. For instance, how can the inhabitants of our large cities with their underserved areas receive appropriate medical care when, as an example, there are only 87 allopathic board-certified family physicians in New York City? That number represents about one specialist in family practice per 85,000 people. We recognize that other physicians are providing "general practice" services in these areas, but many do not have the recognized standard of training excellence in the field: an ambulatory care–based residency and board certification. Rural areas are in even greater need of family physicians, since smaller populations tend not to be able to support more limited specialists. The number of Health Professions Shortage Area designations is rising again. In 1991, Politzer and colleagues reviewed the declining supply of primary care physicians and made specific recommendations for increasing the supply, with special concern for the medically underserved.[2] Their recommendations included awarding more National Health Service Core scholarships, promoting required third-year clerkships in primary care, and creating financial incentives for primary care residency training. However, none of the recommendations addressed medical school class size.

Of great concern to family practice educators is that the decline in the numbers of graduates entering family practice has occurred in many of the medical schools where the departmental faculty members and the medical schools themselves are doing everything "right" to produce family physicians. Those schools are usually large state-supported schools in the midwestern and southern parts of the nation. Numerous factors are cited in the literature for the decline in interest in primary care careers, such as medical school debts, low practice income, lack of a department of family medicine, etc. However, the literature citing the effect of the size of medical school debt on career choice is mixed at best. Schools without a department have always been without one. Family medicine leaders are baffled, since the factors just mentioned have always been a fact of life for family physicians. Medical school experiences clearly affect specialty choices.[3] Lack of curricular time as an influential factor does have good support in the literature, but this issue relates to a smaller number of schools. Indeed, if anything, family practice departments have been increasing curricular time at many medical schools during the 1980s. Babbott and colleagues have documented the trends in specialty choice, including the decline of interest in primary care.[4] These studies rarely discuss class size as a potential factor in the decline.

We believed it was important to analyze the national data regarding the potential impact of the reduction

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in class sizes that began in the late 1980s at many medical schools, since it was noticed in our state of Ohio that there was a dramatic decline in the numbers of graduates entering family practice and that this decline occurred primarily in those schools where class sizes decreased the most. Like the rest of the country, our state was feeling the cry from numerous quarters, especially subspecialists in urban areas, that we have too many doctors, in spite of a statewide shortage of inner-city and rural primary care physicians. Medical school deans responded by reducing class sizes.

Method

Data were obtained from the book *Facts About: Family Practice* from the AAFP, 1990, and the recent update from Schmittling and colleagues.[1] This census is performed by family practice residency directors, who list all their first-year residents, their medical schools of graduation, and the months and years of graduation. Additionally, the American Medical Association numbers are used for the reports of class size. Data were extracted regarding the numbers of graduates of medical school classes during the ten years from 1981–1990 and the numbers of students going into family practice. The AAFP surveys residencies annually to obtain its data. We focused upon the schools that were producing the most family physicians, i.e., over 100 graduates in the decade, as this cohort accounts for 86% of the total production of family physicians in this decade. The data we reviewed and analyzed were the percentage change in class size, the actual change in class size, the percentage of graduates in each year entering family practice, the percentage change and the actual change in number of students entering family practice, and the number of graduates and the number of family physicians produced (the latter two are provided directly in the AAFP book). Ten years were selected because we recognized that medical schools have variations from class to class in specialty-choice decisions. For statistical analysis, we used analysis of variance (ANOVA), Tukey's honest significant difference (HSD) for multiple comparison, and the binomial test.

The data were analyzed to evaluate the effect of the total decrease in the number of graduates from medical school and how it relates to the drop in the production of family physicians. Osteopathic medical schools are not included in this study since the data from these medical schools were not included in the AAFP data until data on the 1990 graduating class was reported by Schmittling and colleagues.[1]

The 81 medical schools producing the bulk of the nation's family physicians were divided into three groups based upon changes in graduating-class sizes during the 1980s. For each school, we averaged the class sizes for 1981 and 1982 and compared this with the average for 1989 and 1990. The *large-decrease* group (31 schools) was defined as those schools with drops of more than ten graduates from 1981–1982 to 1989–1990. The *small-decrease* group (23 schools) was defined as those schools with drops of one to ten graduates during the same period. The *increased-size* group (27 schools) comprised those schools that had either increased numbers of graduates or no change in numbers (as a whole, the group showed an increased number). The years 1981 through 1990 were broken into subsets of four, three, and three years for analysis. Those cohorts were chosen recognizing that the last three years are the years of decline of graduates entering family practice.

Results

The three groups of schools were compared in terms of the numbers and percentages of their students who chose family practice programs for their residency training, as shown in Table 1.

Using ANOVA, we found a statistically significant change across time in the production of students entering family practice per year from the period 1981–1984 to the period 1988–1990 for the 81 medical schools taken as a whole ($F = 18.92$; df = 2,156; $p < .001$). There was also a difference between the three groups in terms of the rates of decrease in their production of students choosing family practice for their residencies ($F = 2.12$; df = 4,156; $p = 0.08$). Tukey's HSD was used to identify how the family medicine decreases varied by group. Analyses revealed that the difference was produced by the large significant drop in productivity of the large-decrease group. The decreases in productivity of the other two groups were less than half as large and were not statistically significant.

Between 1981–1984 and 1988–1990, the 31 schools in the large-decrease group had a fall in the annual production of family physicians of 6.3 graduates per school, compared with the 23 schools in the small-decrease group with a drop of 2.7 and the 27 schools in the increased-size group with a drop of 2.5. The latter group, as shown in Table 1, showed a combined drop in production of family physicians of 67, or 12.3%; the large-decrease group showed a combined fall in graduates entering family practice of 195 or 24.4%. Since in all 126 U.S. medical schools the total decline in family practice graduates per year in 1988–1990 compared with 1981–1984 was 347, the large-decrease group, of 31 primarily large state schools with about 30% of all graduates nationwide, accounts for 56% of the atrophy in the national production of family physicians. Of note, those large-decrease schools appear to be the very schools that have been most successful in producing family physicians and are usually characterized by a strong commitment on the part of admission committees, curriculum committees, administrators, etc.

As also shown in Table 1, the data were analyzed by looking at the groups' declines in the average annual percentages of graduates entering family practice residencies. When percentages are used, the data do not seem to show a problem. In fact, the average annual percentage of graduates entering family practice dropped slightly more in the increased-size group than it did in the other groups. But percentages do not fill family practice residencies or small towns or

Table 1

Numbers of All Graduates and Numbers and Percentages of Graduates Entering Family Practice Residencies for Three Groups of Medical Schools Based on Changes in Class Size, 1981–1990*

Class-size Group	No. and % Graduates by Time Period			Change (1981–1984 versus 1988–1990)	
	1981–1984	1985–1987	1988–1990	In No. or % Points	(In %)
Increased-size group (n = 27 schools)					
Average no. graduates per year	3,397	3,689	3,668	271	(8.0%)
Average no. entering family practice residencies per year	545	526	478	−67	(−12.3%)
Average % entering family practice residencies per year	16.0%	14.3%	13.0%	−3.0	(−18.7%)
Small-decrease group (n = 23 schools)					
Average no. graduates per year	2,889	2,905	2,813	−76	(−2.6%)
Average no. entering family practice residencies per year	411	392	350	−61	(−14.8%)
Average % entering family practice residencies per year	14.2%	13.5%	12.4%	−1.8	(−12.7%)
Large-decrease group (n = 31 schools)					
Average no. graduates per year	5,195	4,975	4,633	−562	(−10.8%)
Average no. entering family practice residencies per year	800	729	605	−195	(−24.4%)
Average % entering family practice residencies per year	15.4%	14.7%	13.1%	−2.3	(−14.9%)

*The authors analyzed the effect of declining class size on the numbers of graduates entering family medicine residencies, using data from ten years of graduating classes (1981–1990) from the 81 medical schools graduating the most family physicians. The schools were divided into three groups based on changes in their graduating-class sizes between 1981–1982 and 1989–1990. The *increased-size* group consisted of those schools that showed increases or no change; the *small-decrease* group comprised schools that showed decreases of from one to ten graduates; and the *large-decrease* group consisted of the schools that had decreases of more than ten graduates.

rural areas or inner cities. Analysis of the numbers of family physicians produced by the three groups shows the dramatic impact discussed previously. The impact from the changes in the actual numbers of graduates more than offsets any impact from the changes in average annual percentages. Specifically, the drop of 24.4% in the actual numbers of graduates entering family practice in the large-decrease group versus 12.3% and 14.8% for the other group represents nearly a twofold difference.

Table 2 shows the percentage changes in total numbers of graduates and numbers of family practice graduates for the 31 schools in the large-decrease group between 1981–1984 and 1988–1990. This huge contribution to the decline in the number of family physicians from a small number of schools is notable, as is the relationship of decline in class size to production of graduates entering family practice. Of the 31 schools, 21 showed a larger percentage decrease in family practice graduates than in total graduates (binomial test, p = .07). There appears to have been a significant, persistent effect of the decreasing class size on the production of family physicians in direct proportion to the change in class size in the large-decrease group, with 12 of the 20 schools having the greatest decreases in class size also having greater than 30% declines in the production of family physicians.

Discussion

There is a crisis in the provision of primary health care in this country. In 1981, 38.8% of medical school graduates planned to enter primary care specialties; this percentage plummeted to 25.4% in 1989.[5] Nutter and colleagues urged academic medicine to respond to physician-supply needs in the area of primary care.[6] Specific factors include the need for physicians to care for a burgeoning geriatric population and for underserved populations in rural areas and inner-city areas. There has been no solid explanation to this date as to why there have been marked declines in the numbers of family practice graduates and internal medicine graduates in the last four years.

The data presented here would appear to strongly support the concept that the widespread decision to decrease the numbers of medical school graduates in the late 1980s has greatly contributed to the shortage of

family physicians. The schools with steady or increasing enrollments have blunted the impact of the drop in the numbers of graduates entering family practice. In the large-decrease group of schools, the drop in the numbers of graduates entering family practice has been accentuated.

Other factors involving specialty preference have been studied in recent years. Rabinowitz noted a significant attrition among the students who, before entering medical school, had said they were interested in family practice as a career; yet importantly he noted that the students who had this initial interest were still three times more likely to enter family practice residencies, in spite of the attrition, than were students who had originally considered other careers.[7] The same author has also evaluated the critical importance of a required third-year family practice clerkship and its impact upon career choice.[8] Dial and Elliot noted the very important role that federal scholarships play in assisting recipients toward primary care careers.[9] The lesser availability of the National Health Services Corps' scholarships in the late 1980s may well have been another factor in the overall decline of primary care careers. Dial and Elliot found that large debts did not play a role in deflecting students from primary care.

Another factor, seldom noted, is the likely loss of family practice physicians to the ambulatory type of training emphasized in the new emergency medicine residencies and the resurgent growth of combined internal medicine–pediatrics programs in the past decade. But the growth of those two fields occurred mainly before the drop in career interest in family practice. Still, the growth of the two fields may explain part of the slippage of family practice graduates not accounted for by class size. Also, as the number and size of programs in primary care internal medicine grow, these programs may attract students who would otherwise have entered family medicine. On the other hand, offsetting this factor is the huge decline of physicians entering general internal medicine.

Thus, it appears imperative that medical school deans, university presidents, state boards of regents, and other concerned parties address the effects of the decline in class size in their medical schools on family practice residency choices if they wish to have a pool of primary care physicians in the twenty-first century. This is a crucial issue because the 1990s appear to be a time for downsizing medical school class size.[10] Our data strongly suggest that, although some slippage in family physician production would have occurred, had the 31 schools remained constant in enrollment instead of dropping about 20 students per year, the United States would have graduated about 75 more family physicians annually in the late 1980s.

Another alternative that could possibly work (but hasn't been implemented despite much discussion) would be a marked decline in the number of non–primary-care specialty residencies that are offered by hospitals. Medical school deans and their university hospitals have been particularly reluctant to consider this option because of their large teaching

Table 2

Percentage Changes in Numbers of All Graduates and Numbers of Graduates Entering Family Practice Residencies for the 31 Schools in the Large-decrease Group between Two Time Periods, 1981–1984 versus 1988–1990*

School	% Change in No. Graduates	% Change in No. Family Practice Graduates
Mississippi	−30.0	−42.2
Michigan	−23.0	−44.4
Howard	−22.5	+6.7
Oregon	−20.9	−8.8
Maryland	−19.6	−59.7
Tennessee	−18.1	−2.2
Kentucky	−16.4	−45.7
Hahnemann	−15.8	−67.5
U. of Indiana	−15.1	−38.0
Oklahoma	−14.7	−57.9
Louisville	−12.3	−37.7
Penn. State, Hershey	−12.3	−57.2
Missouri, Columbia	−10.2	−30.9
Minnesota	−9.7	−21.6
Cincinnati	−9.1	−4.8
Alabama	−9.0	+2.8
Rush	−8.4	−20.6
U. of South Carolina	−8.0	−50.8
California Davis	−7.9	+0.4
UCLA	−7.3	−35.3
Arkansas	−7.1	−20.6
U. of Wisconsin	−6.6	−19.5
Loma Linda	−6.0	+9.6
Baylor	−5.9	−2.5
Med. College of Georgia	−5.8	+35.3
Iowa	−4.9	−15.7
Texas, Galveston	−4.9	−22.2
St. Louis	−4.5	+38.0
U. of Illinois	−4.4	−16.8
Loyola	−1.5	−15.4
Jefferson	−1.2	−8.5

*The authors analyzed the effect of declining class size on the numbers of graduates entering family medicine residencies, using data from ten years of graduating classes (1981–1990) from the 81 medical schools graduating the most family physicians. The schools were divided into three groups based on changes in their graduating-class sizes between 1981–1982 and 1989–1990. The *large-decrease* group consisted of the schools that had decreases of more than ten graduates. Smaller decreases may appear here, since this table displays data for more years, i.e., 1981–1984 and 1988–1990.

and service needs and internal faculty pressures. Problematically, even if university hospitals chose this option, community hospitals could continue to offer non-primary-care positions. Another factor in this situation is the inability of residency review committees to limit residencies in certain oversupplied subspecialties, since their function is to evaluate quality of the residency, not to serve as a monitor of physician supply.

Medical schools receive literally billions of tax dollars for the production of physicians, yet the low output of primary care physicians has been cited by Robert G. Petersdorf, the president of the Association of American Medical Colleges (AAMC), as a particular failure of academic medical centers that requires urgent attention.[11] Somewhat paradoxically, it was Petersdorf who in 1986 urged the member institutions of the association to cut their class sizes in order to decrease the supply of physicians by means of a "manpower diet,"[12] which they did. Of great concern is that 14 medical schools, all with huge amounts of public support in the form of research grants, Medicare teaching reimbursements, and Medicare-Medicaid patient care revenue, had three or fewer graduates in 1990 who entered the discipline of family medicine. It appears that the availability of residencies in the limited specialties and a new paucity of medical school graduates is a major problem for producing family physicians.

One possible explanation for why this newly reported phenomenon, the relationship of the decline in class size and of the shortage of primary care physicians, occurs could be that presented in the following scenario: A medical school produces 200 graduates and 80 go into primary care specialties, so that 120 go into the other specialties. Then the medical school decides to cut the class size by 40 students such that there are 160 graduates every year. If there is the ready availability of a dermatology, ophthalmology, orthopedic, radiology, or some other popular residency, these limited specialty slots will probably continue to be filled. (We are aware that certain institutions have over 300 applicants for two or three dermatology residency positions.) Thus, one can postulate in this scenario there would indeed be 40 fewer students graduating from the medical school, but there might be 110 graduates going to the extremely popular, yet limited, specialties. Thus, the number of graduates from the medical school would decline by 20% (40 taken from the original base of 200), but the number of students entering primary care specialties would decline to 50 (30 fewer than the original base of 80), a 38% decline in the production of primary care physicians. Therefore, a 20% decrease in class size results in an 8% drop in specialty residents but a 38% drop in primary care residents.

Looking at the problem in opposite fashion may be even more useful. Adding 2,000 medical graduates annually should increase the output of primary care physicians by more than 50%, since nearly all the limited specialty positions are already being filled. The recent marked increase in the numbers of medical school applicants makes such an option possible to achieve while maintaining quality students.

The numbers of students entering general internal medicine appear to be declining even more than the numbers entering family practice, over a 50% decline according to the AAMC.[5] The decline in the numbers of students who are entering general internal medicine occurs at a time when this problem is compounded by the aforementioned decrease in class size. When one considers the numbers of pediatricians who enter subspecialties, the best estimates in the early 1990s suggest that only 23% (and falling) of our U.S. medical school graduates enter primary care, less than half the 50% felt needed by most authorities. Schroeder and colleagues make the case that thus far many deans have not responded and that academic medicine has let the public down in many areas excepting its research and technology successes.[13] Physician supply can and must be addressed by these public institutions.

Conclusion

Our findings suggest that the large decline in the class sizes of medical schools, particularly large state schools traditionally strong in producing primary care physicians, has been a major factor in the disastrous fall in production of family physicians. Immediate action by the deans and institutions is imperative to halt this worsening problem.

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Relationship between Indebtedness and the Specialty Choices of Graduating Medical Students

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As medical students shy away from generalist training leading to careers in family practice, general internal medicine, and general pediatrics, there is concern that mounting educational debt is driving students toward the more remunerative fields and thwarting efforts to overcome the country's shortage of primary-care physicians. Carrying the issue further, a well-known columnist recently attributed the high cost of health care in America to the indebtedness of medical students that causes them to pick high-income specialties where "they will then perform all the high-cost procedures that produce both their pay and bills from other providers for the high-tech tests, million-dollar machines and hospital treatments that create America's humongous medical bill."[1]

In truth, studies over the past decade have shown variable, and generally weak, relationships between the indebtedness of students and their choices of specialty training and practice.

French[2] reported that higher levels of debt were not found to be associated significantly with the choice of more lucrative specialties, based on a survey of residents and fellows at the University of Michigan Hospital. Bazzoli,[3] in a 1983 national survey of resident physicians by the American Medical Association, found that a high level of nonsubsidized debt [HEAL (Health Education Assistance Loan) loans] was associated with less likelihood of primary-care specialty choice. Geertsma and Romano[4] found that 1983 graduates of the University of Rochester who planned subspecialist careers had higher mean debt levels than did students intending generalist practice. Lindley and Dial[5] and Dial and Elliott,[6] from analyses of the Association of American Medical College's (AAMC's) 1983 Medical School Graduation Questionnaire, determined that debt was a weak discriminant but that high indebtedness was associated with a tendency to choose non-primary care specialties. Singer[7] concluded from a study of the 1983 cohort of U.S. medical school graduates followed through five postgraduate years that indebtedness at the time of graduation was a "significant but quite weak factor influencing primary care versus non-primary care specialty preference." A report by Park[8] showed no correlation between the mean indebtedness of 1989 medical school seniors and their generalist and specialist-subspecialist career intentions over a wide range of debt.

In response to the body of evidence that debt does not play a major role in specialty choice, some have suggested that researchers have measured the noise produced by confounding variables that masks the real influence of debt. Looked at in the aggregate, competing influences would have the effect of canceling out each other. As an illustration, students with limited resources might be driven toward or away from generalist specialties, depending on how they weigh the advantages of shorter training and less debt accrual versus greater debt accrual but better repayment prospects with longer subspecialty training.

A second confounding effect is the potentially different burdens of similar levels of debt, depending on whether the debt interest is subsidized [i.e., interest does not accrue during school and subsequent deferment and grace periods—Stafford, Perkins, HPSL (Health Professions Student Loan), and SLS (Supplemental Loans for Students) loans], or whether interest accumulation and compounding from the date of borrowing increases the burden of repayment (HEAL, MEDLOANS Alternative Loan Program, some private borrowing arrangements).

Exploration of the effect of repayment burden requires a look at the proportionate high-burden debt levels across different specialties.

Analysis of debt effect is confounded further by the coincidence of medical schools' educational and experiential variables. For example, it is hard to determine whether the higher non-generalist preferences of students at private medical schools are the effect of the greater indebtedness of students at private schools or the result of lesser educational exposure to the generalist specialties (especially family medicine) in those schools' curricula.

The purpose of this study was to evaluate the relationship between educational debt and specialty choice in the light of substantially higher student indebtedness occurring since the research on the graduating classes of the 1980s. In particular, this work has attempted to determine whether rising debt is a significant factor accounting for the declining interest of graduates in the generalist specialties. The study has examined the absolute and relative effects of debt on choices across individual and grouped specialties–subspecialties and has looked at private and public school influences, lengths of residency training, and the differential effects of debt burden across specialty choices of graduating students.

DATA SOURCES

Most of this analysis was based on data accumulated from the AAMC's Medical School Graduation Questionnaire (GQ), in particular that completed by the 1992 graduating classes. Altogether, there were 15,365 graduates in 1992; 12,088, or 78.7%, completed the questionnaire. Of the respondents, 8,053 declared their plans for specialty–subspecialty certification, while the

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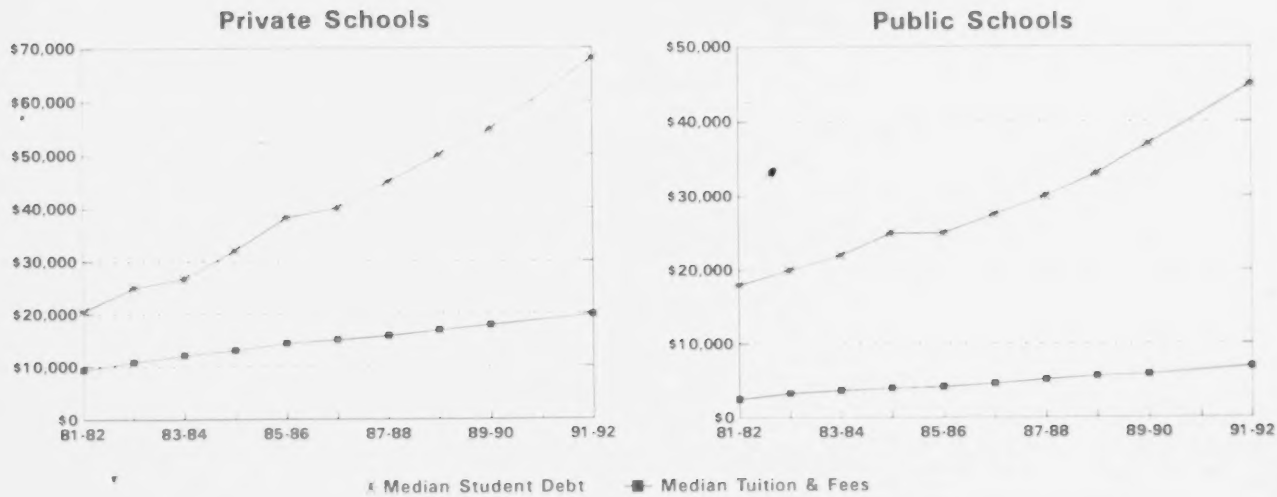

Figure 1. **Median educational debt of medical students and median tuition and fees of medical schools, 1981–82 through 1991–92. For public schools, the tuition and fees are for in-state residents.**

remainder were undecided.

Data on specialty choice from the 1992 GQ are not strictly comparable with pre-1990 findings. Changes in the question about planned certification, initiated in 1990, differentiated specialty and subspecialty decisions and uncovered a greater number of undecided responses than the earlier question format.

TUITION AND INDEBTEDNESS TRENDS

Figure 1 shows that the combined premedical and medical school indebtedness of graduating medical students has continued to rise over the past decade, with the debt levels greater for private medical schools than for public schools. For both private and public schools, the rise in indebtedness has been steeper than the increase in tuition and fees. The median levels of debt of indebted senior students were $20,500 and $18,000 in private and public medical schools, respectively, in 1981–82, rising to $68,000 and $45,000 in private and public schools, respectively, in 1991–92. (Prior AAMC reports have described students' *mean* debt. This overstates the central tendency because of the influence on the *mean* of a relatively small number of extreme values. Therefore, this report employs *median* debt as a more accurate measure of central tendency.)

TUITION AND FEE COMPONENT OF MEDICAL SCHOOLS' TOTAL REVENUE

Table 1 indicates that, over the past decade, income from medical student tuition and fees has declined slightly as a percentage of the total revenue of public schools, from 2.70% in 1982–83 to 2.24% in 1990–91. Tuition and fees constituted 7.31% of total private schools' revenue in 1981–82 and declined to 4.55% of total revenue in 1990–91. It must be acknowledged, however, that the apparent declines may be an artifact of increases in total revenue (or disclosure thereof) represented in the schools' annual financial reporting (the LCME Part 1A Annual Financial Questionnaire administered by the Association of American Medical Colleges).

TABLE 1. Tuition and Fee Percentages of Total Medical School Revenues (Dollars in Thousands)

	Public Schools			Private Schools		
Year	Total Revenue	Tuition & Fees	% Tuition & Fees	Total Revenue	Tuition & Fees	% Tuition & Fees
1982–83	$ 4,491,463	$121,143	2.70%	$ 3,704,377	$270,873	7.31%
1983–84	4,916,296	138,384	2.81	4,122,779	303,462	7.36
1984–85	5,463,349	150,334	2.75	4,638,593	329,410	7.10
1985–86	6,068,111	167,551	2.76	5,024,242	352,056	7.01
1986–87	6,560,908	178,358	2.72	6,036,009	374,940	6.21
1987–88	7,340,665	189,552	2.58	6,755,351	396,322	5.87
1988–89	8,803,704	209,776	2.38	7,947,299	418,078	5.26
1989–90	9,908,365	224,414	2.26	8,918,985	441,678	4.95
1990–91	10,801,399	241,790	2.24	10,203,275	464,359	4.55

TABLE 2. Mean Ratings of Factors Influencing Choice of Medical Specialty*

	1990	1991	1992
Courses or clerkships in the area	3.2	3.1	2.4†
			3.1†
Type of patient problems encountered	3.3	2.8	2.9
Intellectual content of the specialty	3.2	2.8	2.9
Challenging diagnostic problems	3.2	2.8	2.8
Example(s) of physician in the specialty	3.1	2.8	2.9
Possess skills or talent unique to specialty	3.0	2.8	2.6
Consistent with personality		3.0	3.0
Opportunity to provide primary care	2.2	2.2	2.6
Good income (relative to other specialties)	1.8	1.7	1.7
Length of residency	1.3	1.7	1.7
Ease of getting a residency		1.6	1.6
Minimum uncertainties in diagnosis or therapy	1.4	1.7	1.7
Prestige within profession	1.5	1.6	1.7
Level of educational debt	0.8	1.7	1.8

Sources: Medical School Graduation Questionnaires, 1990, 1991, and 1992.

*Rating on a scale of 0 = no influence to 4 = major positive influence.

†In 1992, courses and clerkships were rated separately.

INDEBTEDNESS IN THE HIERARCHY OF FACTORS INFLUENCING SPECIALTY CHOICE

Since 1988, the GQ has captured students' ratings of factors that influenced their specialty choices. Over time, the responses of successive graduating classes have shown a remarkably consistent hierarchy of influences (Table 2).

According to senior students, the factors of greatest influence were the courses in the area, particularly the clerkships; the type of patient problems encountered; the intellectual content and challenge of the specialty; the example of a physician in the specialty; and the fit of personal skills and talent with the specialty. Students rated the level of educational debt well below these factors.

MEDICAL STUDENTS' DECLINING INTEREST IN GENERALIST SPECIALTIES

Table 3 shows that the number of students planning certification in the generalist specialties has declined significantly over the past decade. In 1982, 36.1% of graduates planned certification in the generalist specialties; in 1992, only 14.6% had such intentions.

It must be noted that these are percentages of the total numbers of graduating students who had decided about a particular specialty-subspecialty, either as the sole choice or the first choice of those under consideration. Students planning generalist specialty certification were those intending certification in family practice, general internal medicine, and general pediatrics and *not* planning subspecialty certification in these fields. In 1992, there was another 26% of students across these specialties planning generalist certification but undecided about subspecialty certification. For purposes of this study relating debt to specialty choice, only the clear choices were examined and no attempt was made to estimate how the undecided cohorts might eventually be allocated between generalist and subspecialist categories.

MEDICAL STUDENTS' RISING INTEREST IN NON-GENERALIST SPECIALTIES

During the past decade, there has been rising interest of graduating students in the medical specialties and the support specialties (see definitions in the footnote to Table 4).

In 1992, 32.1% of graduating students planned certification in the medical specialties, compared with 17.6% in 1982. Individual fields of increased popularity have included the subspecialties of internal medicine (particularly cardiology, gastroenterology, geriatrics, and pulmonary diseases), pediatrics (pulmonology, cardiology, hematology-oncology, and nephrology), and allergy-immunology and dermatology.

In 1992, 23.7% of graduating students planned certification in the support specialties, compared with 14.7% in 1982. Fields of

TABLE 3. Percentages of Graduating Seniors Planning Certification in Generalist Specialties*

Specialty	1982 (%)	1987 (%)	1992 (%)
Family medicine	15.5	14.8	9.0
General internal medicine	14.4	8.6	3.2
General pediatrics	6.2	5.7	2.4
Total generalist specialties	36.1	29.1	14.6

Sources: Medical School Graduation Questionnaires, 1982, 1987, and 1992.

*Beginning in 1990, the question about specialty certification was changed to differentiate specialty and subspecialty choices at the time of graduation. Thus, 1992 figures are not strictly comparable with pre-1990 data. The percentages shown here are based on 10,062, 10,386, and 8,053 responding students in 1982, 1987, and 1992, respectively, who had decided on certification.

TABLE 4. Percentages of Graduating Seniors Planning Certification in Non-generalist Specialties*

Specialty Certification Group	1982 (%)	1987 (%)	1992 (%)
Medical specialties†	17.6	23.2	32.1
Surgical specialties‡	31.6	29.4	29.5
Support specialties§	14.7	18.3	23.7

Sources: Medical School Graduation Questionnaires, 1982, 1987, and 1992.

*Percentages based on 10,062, 10,386, and 8,053 responding students in 1982, 1987, and 1992, respectively, who had decided on certification (see further explanation, Table 3).

†Medical specialties are family practice subspecialties, internal medicine subspecialties, pediatric subspecialties, psychiatry and neurology and their subspecialties, allergy and immunology and subspecialties, and dermatology and its subspecialties.

‡Surgical specialties are general surgery and its subspecialties, colon and rectal surgery, neurological surgery, obstetrics and gynecology and subspecialties, ophthalmology, orthopedic surgery, otolaryngology, plastic surgery, thoracic surgery, and urology.

§Support specialties are anesthesiology and its critical care subspecialty, emergency medicine, nuclear medicine, pathology and its subspecialties, physical medicine and rehabilitation, preventive medicine and public health, and radiology and related subspecialties.

increased interest in the support specialties have included anesthesiology, emergency medicine, and radiology.

The percentage of intended certification in the surgical specialties decreased slightly between 1982 and 1987 (from 31.6% to 29.4%) and was virtually unchanged in 1992 (29.5%).

RELATIONSHIP BETWEEN INDEBTEDNESS AND CHOICE OF SPECIALTY

Table 5 enumerates the specialty certification choices of those 1992 medical school graduates who had made specialty-

TABLE 5. Indebtedness of 1992 Medical School Graduates by Specialty Certification Choice*

Specialty Certification Choice	Number	Median Debt	Level of Debt				Percentage of Total Debt from High-burden Sources†
			Percentage with No Debt	Percentage with Debt up to $49,999	Percentage with Debt between $50,000 and $74,999	Percentage with Debt ≥ $75,000	
Allergy and immunology	26	$50,000	11.5	30.8	30.8	26.9	28.5
Anesthesiology and critical care	549	52,500	17.0	36.6	20.9	25.5	25.1
Colon and rectal surgery	19	52,500	15.8	36.8	31.6	15.8	23.9
Dermatology and subspecialties	153	50,000	23.5	35.6	20.8	20.1	20.6
Emergency medicine	440	52,100	13.8	37.8	21.4	27.0	23.2
Family practice	728	50,000	15.9	42.0	22.8	19.3	17.6
Family practice subspecialties	153	50,000	17.9	39.1	25.2	17.9	22.1
General internal medicine	255	50,000	13.3	40.3	22.2	24.2	21.9
Internal medicine subspecialties	1,318	50,000	21.8	36.5	21.4	20.3	21.7
Neurology and child neurology	177	50,000	22.2	33.3	19.3	25.1	25.1
Obstetrics–gynecology	218	55,700	13.0	36.2	30.9	19.8	21.6
Obstetrics/gynecology subspecialties	329	54,750	18.1	35.6	20.9	25.3	25.9
Ophthalmology	275	48,000	23.2	39.7	20.6	16.5	18.6
Pathology	27	40,000	22.2	36.0	21.2	17.5	20.6
Pathology subspecialties	134	50,000	17.7	40.0	22.3	20.0	21.3
General pediatrics	196	47,450	13.7	44.2	22.1	20.0	22.7
Pediatrics subspecialties	429	49,750	16.1	42.0	26.1	15.8	19.4
Physical medicine and rehabilitation	140	50,000	18.7	38.1	21.6	21.6	21.7
Preventive medicine and public health and subspecialties	33	45,000	15.6	46.9	21.9	15.6	16.9
Psychiatry	129	56,500	12.9	35.5	25.8	25.8	21.5
Psychiatry subspecialties	203	50,000	21.0	37.9	23.6	18.5	22.2
Radiology	44	43,988	14.3	47.6	16.7	21.4	14.9
Radiology subspecialties	538	47,000	24.2	40.8	18.5	16.4	21.1
General surgery	172	60,000	27.6	28.8	20.2	23.3	22.5
Surgical subspecialties	293	55,000	21.2	32.5	22.6	23.7	25.0
Nuclear medicine	3	73,000	00.0	00.0	50.0	50.0	38.2
Neurological surgery and critical care medicine	81	55,000	20.0	29.3	25.3	25.3	29.1
Orthopedic and hand surgery	429	50,000	23.1	36.1	20.2	20.7	24.3
Otolaryngology	191	50,000	25.4	36.0	21.2	17.5	22.5
Plastic and hand surgery	118	53,000	26.3	33.3	24.6	15.8	27.4
Thoracic surgery	97	50,000	20.7	31.5	31.5	16.3	24.5
Urology	154	50,000	22.4	38.1	19.0	20.4	22.5
Total decided respondents	8,053	50,000	19.4	37.7	22.1	20.8	22.2
Total undecided respondents	2,859	50,000	19.6	38.8	21.0	20.6	21.0
No response/not planning certification	1,176	50,000	20.7	37.2	21.7	20.4	21.0
All respondents	12,088	50,000	18.8	36.6	20.8	20.1	21.6

Source: 1992 Medical School Graduation Questionnaire.

*The number in specialty certification groups, 8,053, represents respondents who had made specialty and subspecialty decisions. Of the total of 12,088 respondents, 2,859 were undecided about specialty and subspecialty certification, and 1,176 did not respond or do not plan to seek certification.

†High-burden debt includes HEAL, MEDLOANS, and some private sources with nonsubsidized interest that accrues from the date of borrowing and is compounded semiannually.

subspecialty decisions, showing for each choice the students' median debt; percentage with no debt; percentages with debts up to $49,999, between $50,000 and $74,999, and $75,000 and over; and the percentage of debt in each case from high-burden sources (primarily HEAL, MEDLOANS Alternative Loan Program, and some private borrowing arrangements in which interest accrues from the date of borrowing and is compounded semiannually).

The overall median debt of indebted students who were decided about specialization–subspecialization was $50,000 in 1992; 19.4% of this group reported no debt; and 20.8% had debt greater than $75,000. There were significant differences in median debt levels across specialties. Of students choosing specialties in significant numbers (100 or more), those planning certification in general surgery had the highest median debt ($60,000), while those opting for radiology subspecialties had the lowest median debt ($47,000).

There was no difference between the median debt levels ($50,000) of students intending certification in the general specialty of internal medicine only and those planning subspecialty certification therein, and there was only a small difference between students opting for general pediatrics only ($47,450) and those planning certification in pediatrics subspecialties ($49,750). For students planning certification in general internal medicine and general pediatrics, the percentage without debt was lower and the percentage with debts of $75,000 or more was higher than for students intending subspecialty training in those fields.

There were higher percentages of debts of $75,000 or more amongst students planning certification in anesthesiology, emergency medicine, psychiatry, and neurological surgery than amongst those choosing family practice, general internal medicine, and general pediatrics.

Debt from high-burden loan sources was more common for students planning certification in anesthesiology, neurology, obstetrics–gynecology subspecialties, and surgery specialties and subspecialties. The percentage of debt from high-burden sources was essentially the same for graduates aiming for general internal medicine and internal medicine subspecialties. Debt was less burdensome for those intending pediatric subspecialization than those choosing general pediatrics.

The patterns of median debt, range of debt, and debt repayment burden shown in Table 5 do not constitute convincing evidence that indebtedness is a significant force driving students away from the generalist specialties and toward the medical and support specialties (as these specialties are defined above). However, it is worth noting that more students selecting anesthesiology, emergency medicine, and surgery subspecialties had high-burden debts and debts over $75,000. On the other hand, fewer students heading for the subspecialties of internal medicine and pediatrics had debts over $75,000 than was true for those selecting the corresponding general specialties; and the debt burden was higher for students choosing general pediatrics than for those intending pediatrics subspecialization.

INDEBTEDNESS OF SPECIALTY CERTIFICATION GROUPS

Table 6 arrays 1992 debt levels for each of the specialty certification groups. The median debt was roughly the same for all specialty groups ($50,000). However, the smallest percentage of graduates without debt had chosen the generalist specialties, and the largest proportion with debts of $75,000 or greater had opted for the support specialties.

INDEBTEDNESS OF MEDICAL SCHOOL GRADUATES IN SPECIALTY CERTIFICATION GROUPS: PRIVATE AND PUBLIC SCHOOLS

Table 7 shows the differences in debt levels between the graduates of private and public schools. The median debt of all private-school students declaring specialty plans was $68,000 in 1992; for graduating students of public medical schools the median debt was $45,000. There was a slightly higher percentage of graduates without debt from private schools (20.1%), compared with graduates of public schools (18.9%). A significantly higher percentage of private-school graduates (35.3%) than public-school graduates (10.9%) had debts of $75,000 or more.

Only 10.4% of private-school graduates with declared intentions planned certification in the generalist specialties, compared with 17.6% of public-school graduates. Of note for private schools, the median debt of students opting for the generalist specialties ($70,000) was identical to that for students planning

TABLE 6. Indebtedness of 1992 Medical School Graduates in Specialty Certification Groups*

Specialty Certification Group	Number	Median Debt	Percentage with No Debt	Percentage with Debt up to $49,999	Percentage with Debt $50,000–$74,999	Percentage with Debt ≥ $75,000
Generalist specialties	1,179	$50,000	15.0	42.0	22.5	20.5
Medical specialties	2,588	50,000	20.1	37.3	22.7	19.9
Surgical specialties	2,378	51,000	21.6	35.1	22.6	20.7
Support specialties	1,908	50,000	18.5	39.0	20.4	22.2
All groups	8,053	50,000	19.4	37.7	22.1	20.8

Source: 1992 Medical School Graduation Questionnaire.
*Specialty certification groups as defined in Table 4.

TABLE 7. Indebtedness of 1992 Medical School Graduates in Specialty Certification Groups: Public Versus Private Schools*

Specialty Certification Group	Number	Median Debt	Percentage with No Debt	Percentage with Debt up to $49,999	Percentage with Debt $50,000–$74,999	Percentage with Debt ≥ $75,000
Private schools						
Generalist specialties	340	$70,000	12.2	25.7	19.9	42.2
Medical specialties	1,176	64,000	19.8	28.8	18.2	33.2
Surgical specialties	1,034	65,500	23.9	25.3	17.5	33.4
Support specialties	730	70,000	19.1	29.3	13.2	38.4
Total	3,280	68,000	20.1	27.5	17.0	35.3
Public schools						
Generalist specialties	839	45,000	16.1	48.6	23.6	11.7
Medical specialties	1,412	45,000	20.4	44.3	26.4	8.9
Surgical specialties	1,344	46,000	19.9	42.6	26.5	11.0
Support specialties	1,178	46,000	18.1	42.9	24.7	12.2
Total	4,773	45,000	18.9	44.7	25.5	10.9
All groups	8,053	50,000	19.4	37.7	22.1	20.8

Source: 1992 Medical School Graduation Questionnaire.
*Specialty certification groups as defined in Table 4.

certification in the support specialties and was greater than the median debts of those heading for the medical specialties ($64,000) and the surgical specialties ($65,500). For public schools, there was little difference in median student debt levels across the specialty certification groups.

On its face, the similarity of the median debt levels of students opting for the generalist specialties and those headed toward the support specialties casts doubt on the level of debt as a determinant of specialty choice. However, it is possible that students with high indebtedness may consider—for different reasons—that either specialty group has a net advantage: the one because three-years' training in a generalist specialty will accrue less debt and allow earlier practice and repayment; or the other because training in a support specialty, while taking longer and accruing more debt, has a better income and repayment dividend waiting at the end.

INFLUENCE OF LENGTH OF RESIDENCY ON SPECIALTY CHOICE

Table 2 shows that length of residency ranked relatively low as a factor influencing graduating students' choices of medical specialties. However, Table 8 indicates that the influence of length of residency differed across the specialty certification groups. Although only 9.0% of all students declaring specialty and subspecialty certification intentions in 1992 rated length of residency as a strong or major influence, 15.2% of graduates selecting generalist specialties and 11.5% of those selecting support specialties gave length of residency strong or major ratings.

Table 9 shows how the 1992 graduates rated the influence of length of residency on their specialty choices, across the specialty certification groups and for various levels of debt. For all specialty groups taken together, between 7.7% of students (those

TABLE 8. Influence of Length of Residency on Specialty Choices of 1992 Medical School Graduates by Specialty Certification Groups*

Specialty Certification Group†	Number	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence
Generalist specialties	1,179	30.0	54.8	15.2
Medical specialties	2,588	50.3	41.7	8.1
Surgical specialties	2,378	64.5	30.6	4.9
Support specialties	1,908	47.2	41.3	11.5
All groups	8,053	50.8	40.2	9.0

Source: 1992 Medical School Graduation Questionnaire.
*Influence of length of residency based on rating scale of 0 = no influence, 1–2 = minor–moderate influence, and 3–4 = strong–major influence (see Table 2).
†Specialty certification groups as defined in Table 4.

TABLE 9. Influence of Length of Residency on Specialty Choices of 1992 Medical School Graduates by Specialty Certification Groups and Debt Categories*

Specialty Certification Group†	No Debt			Debt up to $49,999			Debt between $50,000 and $74,999			Debt ≥ $75,000		
	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence
Generalist specialties	24.4 (40)	61.0 (100)	14.6 (24)	29.6 (134)	57.1 (258)	13.3 (60)	36.0 (86)	49.0 (117)	15.1 (36)	29.1 (64)	50.9 (112)	20.0 (44)
Medical specialties	52.2 (249)	40.5 (193)	7.3 (35)	49.3 (443)	44.0 (396)	6.7 (60)	48.7 (265)	40.4 (220)	10.8 (59)	51.1 (239)	40.6 (190)	8.3 (39)
Surgical specialties	63.6 (297)	32.1 (150)	4.3 (20)	64.0 (488)	31.4 (239)	4.6 (35)	64.6 (318)	29.7 (146)	5.7 (28)	65.2 (291)	28.9 (129)	5.8 (26)
Support specialties	49.5 (151)	40.7 (124)	9.8 (30)	45.3 (305)	43.3 (292)	11.4 (77)	49.1 (172)	39.1 (137)	11.7 (41)	45.6 (173)	40.9 (155)	13.5 (51)
All groups	52.2 (737)	40.1 (567)	7.7 (109)	49.2 (1,370)	42.5 (1,185)	8.3 (232)	51.8 (841)	38.2 (620)	10.1 (164)	50.7 (767)	38.7 (586)	10.6 (160)

Source: 1992 Medical School Graduation Questionnaire.
*Influence of debt on specialty choice based on rating scale given in Table 8. Number of graduates in each group shown in parentheses.
†Specialty certification groups as defined in Table 4.

with no debt) and 10.6% (those with debt of $75,000 or more) rated length of residency as a strong or major factor influencing specialty choice. Students planning certification in the generalist specialties more commonly (14.6% of those with no debt, rising to 20.0% of those with debt of $75,000 or more) considered length of residency a strong or major influence. Students selecting the support specialties more commonly rated length of residency as strongly influential at debt levels of $75,000 or more (13.5%). It is important to note that length of residency reached these levels of strong or major influence at the convergence of specialty choice and level of debt affecting a small fraction of the entire sample of GQ respondents.

DEBT AS A FACTOR IN SPECIALTY CHOICE

In Table 2, the level of educational debt ranks relatively low in the hierarchy of factors influencing graduates' specialty choices. It is possible, however, that indebtedness is a stronger influence on graduates' plans for certification within specialty group choices. Table 10 shows that, overall, 70.2% of the graduates across the specialty groups considered debt to be of no influence on their choices, and 23.6% rated it a minor or moderate influence. Across the specialty groups, only 6.2% of graduates overall rated debt as a strong or major influence on their decisions, ranging from 4.2% of those planning certification in the generalist specialties to 9.6% of those planning certification in the support specialties.

Table 11 shows how the graduates rated the influence of educational debt as a factor in their specialty choices, across the specialty certification groups and for various levels of debt. For no debt, across the specialty groups, only 2.2% of students rated educational debt as a strong or major influence, and there was little difference across the specialty groups. Debt more commonly was rated important with increased debt levels, assuming strong or major influence for 12.9% of those with debts of $75,000 or greater. Debt was rated a strong or major influence more frequently by graduates with debts of $50,000–$74,999 who were planning certification in the support specialties (11.7%) and for graduates with debts of $75,000 or more who

TABLE 10. Influence of Debt on Specialty Choices of 1992 Medical School Graduates by Specialty Certification Groups*

Specialty Certification Group†	Number	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence
Generalist specialties	1,179	73.2	22.5	4.2
Medical specialties	2,588	73.2	22.1	4.7
Surgical specialties	2,378	71.9	22.1	6.0
Support specialties	1,908	62.0	28.4	9.6
All groups	8,053	70.2	23.6	6.2

Source: 1992 Medical School Graduation Questionnaire.
*Influence of debt on specialty choice based on rating scale given in Table 8.
†Specialty certification groups as defined in Table 4.

were planning certification in the surgical (13.9%) and support (20.3%) specialties. However, the number of students with debts of that magnitude and planning certification in these specialties was a small fraction of the entire sample of GQ respondents.

CONCLUSIONS

Analysis of data from the 1992 GQ has shown that educational debt was not a factor significantly influencing most graduates' specialty choices. Debt did not appear to be driving students to subspecialize in most of their chosen specialties, including internal medicine and pediatrics. As a strong or major influence, debt affected the specialty choices of only 6.2% of the 1992 graduates who had decided on a specialty. However, for students with debts of $75,000 or more, debt became more important, having a strong or major influence on the choices of surgical (13.9%) and support (20.3%) specialties. Although the effects of debt on specialty choice were found to be small, taking on greater significance with debts of $75,000 or more, it is disturbing to note that over 20% of medical school graduates have such levels of indebtedness.

Length of residency training, as a factor affecting specialty choice, generally was a strong or major influence for only 9.0% of respondents. However, this number increased to 20.5% for respondents with debts of $75,000 or more who planned generalist specialty certification, suggesting that high debt turned students toward, as well as away from, the generalist specialties.

The importance of debt tends to be exaggerated when evaluated, as here, in isolation. As the GQs have shown consistently over the past decade, other factors far outweigh the effect of debt. Whatever the merit of reducing student debt for its own sake, strategies to enhance interest in the generalist specialties will need to be applied where they are likely to be more influential.

TABLE 11. Influence of Educational Debt on Specialty Choices of 1992 Medical School Graduates in Specialty Certification Groups and Debt Categories*

Specialty Certification Group†	No Debt			Debt up to $49,999			Debt between $50,000 and $74,999			Debt ≥ $75,000		
	Percentage "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence	Percent "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence	Percent "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence	Percent "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence
Generalist specialties	85.1% (137)	11.8% (19)	3.1% (5)	73.3% (330)	24.2% (109)	2.4% (11)	77.2% (183)	17.7% (42)	5.1% (12)	59.2% (129)	32.6% (71)	8.3% (18)
Medical specialties	86.3 (411)	12.2 (58)	1.5 (7)	76.5 (685)	18.8 (168)	4.8 (43)	66.0 (359)	29.0 (158)	5.0 (27)	60.7 (283)	31.1 (145)	8.2 (38)
Surgical specialties	88.4 (410)	9.7 (45)	1.9 (9)	78.5 (598)	18.6 (142)	2.9 (22)	64.6 (319)	28.1 (139)	7.3 (36)	52.3 (234)	33.8 (151)	13.9 (62)
Support specialties	80.6 (245)	16.1 (49)	3.3 (10)	70.4 (473)	24.4 (164)	5.2 (35)	52.7 (184)	35.5 (124)	11.7 (41)	40.6 (154)	39.1 (148)	20.3 (77)
All Groups	85.6 (1,203)	12.2 (171)	2.2 (31)	75.0 (2,086)	21.0 (583)	4.0 (111)	64.3 (1,045)	28.5 (463)	7.1 (116)	53.0 (800)	34.1 (515)	12.9 (195)

Source: 1992 Medical School Graduation Questionnaire.
*†Influence of debt on specialty choice based on rating scale given in Table 8. Number of graduates in each group shown in parentheses.
†Specialty certification groups as defined in Table 4.

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